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REVIEW ARTICLE

Beyond structural defect: quality of life impact of nasal septal perforation in adults – a scoping review of validated patient-reported outcome measures

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Abstract

Background Nasal septal perforation (NSP) is a structural defect of the nasal septum that can lead to significant symptoms and functional impairment. Although airflow dynamics and mucosal disruption have been proposed to explain symptom burden, the impact of NSP on patient quality of life (QoL) has not been systematically synthesized. The aim of this work is to systematically review the literature evaluating QoL outcomes in adults with NSP using validated patient-reported outcome measures.

Methods This review followed PRISMA-ScR guidelines. Searches were conducted in PubMed and Web of Science without date restrictions (latest update: October 2025). Eligible studies included adults with symptomatic NSP in whom QoL outcomes were reported using validated questionnaires. Two independent reviewers screened studies and extracted data.

Results From 686 records, 33 studies met inclusion criteria involving 1638 patients. Study designs were primarily case series (n=21) and cross-sectional studies (n=7), with sample sizes ranging from 6–202 patients. SNOT-22 scores across studies indicated moderate-to-severe QoL impairment (range 38.6–53.7). NOSE scores ranged from 39.0–80.0, while NOSE-Perf scores ranged from 13.8–26.4. Limited studies reported generic QoL outcomes (SF-36) or NSP-specific tools (SEPEQoL), but all reflected significant functional impact. Aetiology was most commonly postsurgical, and anterior perforations predominated. Studies reporting surgical outcomes consistently suggested substantial postoperative improvements across QoL instruments.

Discussion NSP is associated with clinically meaningful QoL impairment, particularly in rhinologic, sleep and psychological domains. Despite growing interest, evidence remains heterogeneous and limited by variable reporting of perforation characteristics and inconsistent use of QoL instruments. Standardized assessment and dedicated NSP-specific outcome measures are needed. Future research should focus on prospective, multicentred studies evaluating both symptom burden and long-term treatment outcomes.

Keywords Nasal septal perforation · Septal perforation · Quality of life · NOSE-Perf · SEPEQoL · SNOT-22 · Nose · SNOT-25 · SF-36

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Introduction

Nasal septal perforation (NSP) is a defect in the total thickness of the nasal septum, including mucosa and cartilage causing a communication between both nostrils. Its causes include prior sinonasal surgeries, intranasal cocaine use, obsessive nasal picking (rhinotillexomania), use of intranasal vasoconstrictors, inflammatory disorders, trauma or idiopathic origins [1]. Although repair techniques have advanced and interest in NSP management is increasing, the

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mechanisms underlying symptomatic burden remain only partially understood.

Common symptoms include epistaxis, crusting, nasal obstruction, rhinorrhoea, and airflow-related discomfort. Several authors have investigated these symptoms through computational fluid dynamics (CFD). Increased downstream airflow velocity and shear stress have been implicated as potential contributors to epistaxis, particularly in perforations exceeding 10 mm diameter [2]. However, others have found no consistent correlation between perforation size and symptoms severity [3]. Only one study has evaluated dynamic airflow parameters in relation to patient-reported quality of life (QoL), demonstrating higher SNOT-22 and NOSE scores in symptomatic versus asymptomatic NSP and showing increased shear stress and heat flux along posterior perforation margins among symptomatic patients [4].

Given the variable symptomatology and multifactorial drivers of discomfort, QoL evaluation is essential for treatment planning and outcome assessment. Standardized QoL instruments such as SNOT-22, NOSE, and the NSP-specific NOSE-Perf scale allow quantification of patient experience and help establish patient-centred decision-making.

Despite the growing body of literature, evidence on quality-of-life outcomes in NSP remains fragmented, with heterogeneous instruments and study designs, and has not been comprehensively mapped to date. The aim of this scoping review was to identify and synthesize all available evidence reporting QoL outcomes in adult patients with NSP.

In the absence of objective severity thresholds or uniform anatomical correlates, patient-reported quality of life outcomes represent a critical determinant for therapeutic decision-making in NSP, including the indication for surgical repair versus conservative management.

To our knowledge, this is the first scoping review specifically focused on validated patient-reported outcome measures in NSP, providing a comprehensive overview of how QoL has been assessed in this condition.

Materials and methods

Protocol and registration

This scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews and is reported following the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines.

A scoping review methodology was chosen due to the anticipated heterogeneity in study designs, patient populations, aetiologies, and outcome measures across the available literature. This approach allowed for a comprehensive mapping of evidence rather than a quantitative synthesis, which was not feasible given the variability of included studies.

Eligibility criteria

Eligibility criteria were defined using the Population–Concept–Context (PCC) framework.

- **Population**: Adult patients (≥18 years) diagnosed with symptomatic nasal septal perforation (NSP).
- **Concept**: Quality of life (QoL) assessment, including the use of validated patient-reported outcome measures (e.g., SNOT-22, NOSE, NOSE-Perf, SNOT-25, SF-36, SEPEQoL, Eq. 5D, RSI).
- **Context**: Any clinical or healthcare setting, without geographical restrictions.

Types of sources

Clinical trials, prospective and retrospective cohort studies, and case series published in peer-reviewed journals were considered eligible. There were no restrictions on publication date. Studies published in English, Spanish, and French were included. The final search update was conducted on 12th October 2025.

Exclusion criteria

The following sources were excluded:

1. Theses, editorials, letters to the editor, and conference abstracts.
2. Studies including patients with other sinonasal conditions (e.g., chronic rhinosinusitis, head and neck radiotherapy, sinonasal malignancies, or autoimmune diseases with sinonasal involvement), unless QoL outcomes attributable specifically to NSP could be clearly isolated.
3. Studies that did not report QoL outcomes clearly or did not specify the assessment instruments used.

Information sources and search strategy

A comprehensive literature search was conducted in PubMed and Web of Science. The search strategy combined controlled vocabulary and free-text terms related to nasal septal perforation and quality of life instruments.

The PubMed search strategy was as follows: ((nasal septal perforation) OR (nasoseptal perforation) OR (septal perforation))

AND ((quality of life) OR (NOSE) OR (SNOT-22) OR (SNOT) OR (NOSE-Perf) OR (SF-36) OR (GBI) OR (EQ-5D)).

Reference lists of included studies were manually screened to identify additional relevant sources.

Selection process

Screening was performed by manual process. Two reviewers independently screened titles and abstracts for eligibility. Full-text articles were retrieved when necessary to determine inclusion. Any disagreements were resolved through discussion and consensus.

Data charting process

Data were extracted using a predefined data-charting form developed iteratively by the review team. Extracted data included:

- Author and year of publication.
- Country of origin.
- Study design.
- Sample size.
- NSP characteristics (aetiology, size, and location, when reported).
- QoL assessment tools used.
- Timing of QoL assessment (baseline, postoperative, follow-up).
- Key findings related to QoL outcomes.

Synthesis of results

Results were synthesized descriptively and presented in tables and narrative form. The synthesis focused on:

- Types of QoL instruments used in NSP research.
- Clinical contexts in which QoL has been assessed.
- Trends in reported QoL outcomes.
- Gaps in the existing literature.

No critical appraisal of methodological quality was undertaken, as this is not a mandatory component of scoping reviews.

Results

Study selection

A total of 686 relevant articles were identified through the electronic databases search Web of Science ($n=384$) and PubMed ($n=296$), and citation searching ($n=6$). Duplicate records were identified and removed prior to title and abstract screening.

Following the titles and abstracts screening, 369 articles were excluded for further analysis. A total of 37 full-text articles were assessed in the subsequent stage, in which 4 were excluded due to irrelevant data and different study populations. Finally, 33 articles with 1638 patients were included in this scoping review following a discussion among the investigators, and full data extraction was performed for these articles. A detailed list of the 4 excluded studies is provided in Table S1.

The article selection process for this study was summarized using the PRISMA flow chart. (Fig. 1)

Study characteristics

The geographical distribution of studies included nine countries: USA ($n=14$, 42.4%), Spain ($n=4$, 12.1%), UK ($n=4$, 12.1%), South Korea ($n=3$, 9.1%), Russia ($n=2$, 6.1%), Turkey ($n=2$, 6.1%) and Germany, Canada, China and Brazil ($n=1$ each, 3.0%).

Study designs included case series ($n=21$), cross-sectional studies ($n=7$), cohort studies ($n=4$), and diagnostic test accuracy studies ($n=1$). Perforation aetiology was reported in 24 studies, with previous septal surgery the most common cause. Only 6 of 33 studies (18.2%) reported precise perforation location, with anterior defect predominating, while 24 studies reported size measures.

Across the included studies, iatrogenic causes, particularly prior septal surgery, represented the most frequently reported aetiology of NSP. However, the reporting of aetiology was inconsistent, and studies did not provide stratified analyses comparing QoL outcomes between iatrogenic and non-iatrogenic cases.

Results of QoL outcomes (Table 1)

SNOT-22

Ten studies reported SNOT-22 results, and domain-level scores were available in four of them (Table 2). Baseline SNOT-22 scores ranged from 38.6 to 53.7, indicating moderate-to-severe QoL impairment, based on published interpretation thresholds [4–13]. Among domains, rhinologic symptoms, sleep disturbance, and psychological dysfunction were the most consistently affected [7, 10–12]. Two studies reported SNOT-25 scores, a modified version of SNOT-22 validated for NSP and ranged from 45.17 to 58.60 [14, 15].

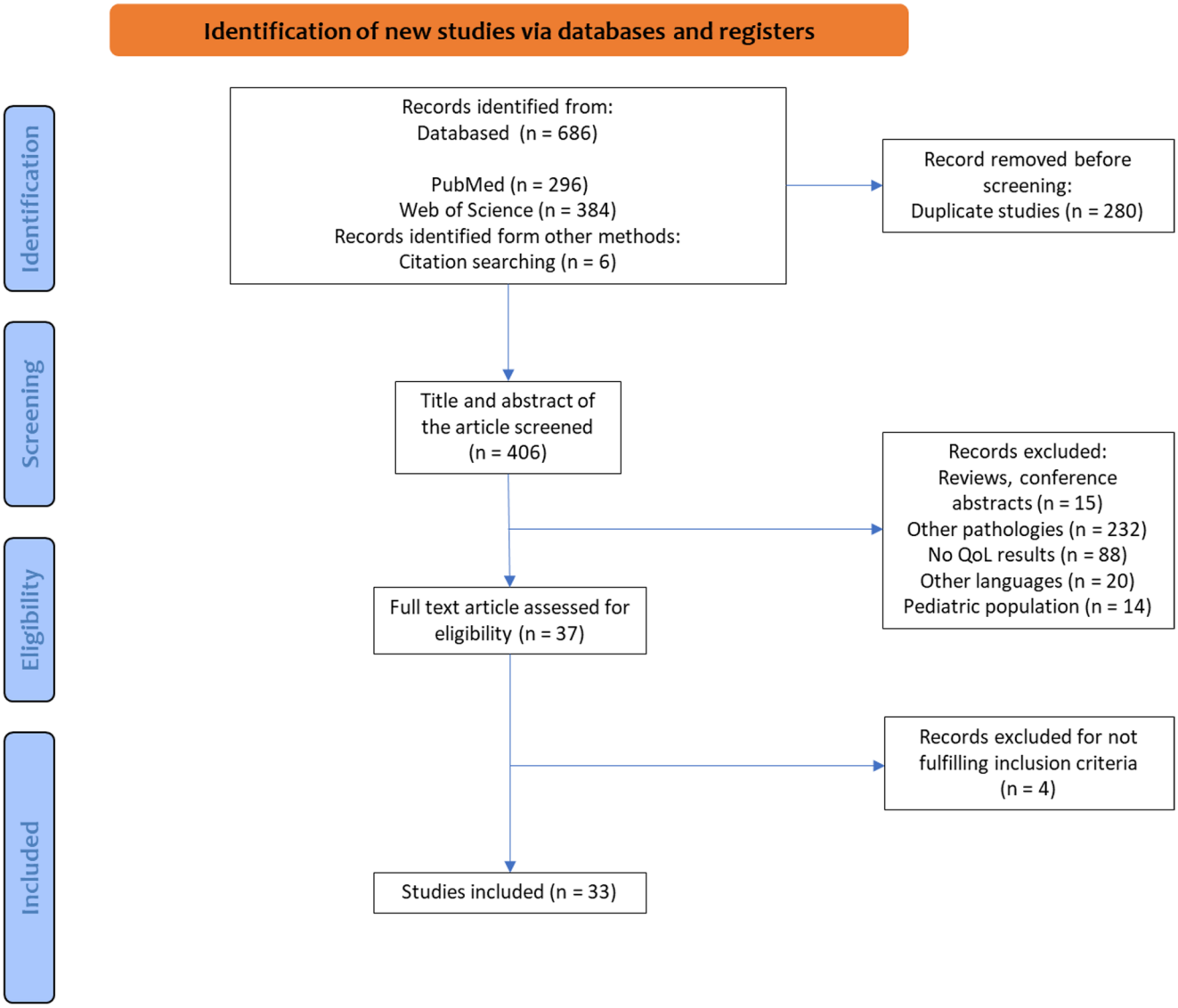
Identification of new studies via databases and registers
Identification
Screening
Eligibility
Included
Records identified from:
Databased (n = 686)
PubMed (n = 296)
Web of Science (n = 384)
Records identified form other methods:
Citation searching (n = 6)
Record removed before screening:
Duplicate studies (n = 280)
Title and abstract of the article screened (n = 406)
Records excluded:
Reviews, conference abstracts (n = 15)
Other pathologies (n = 232)
No QoL results (n = 88)
Other languages (n = 20)
Pediatric population (n = 14)
Full text article assessed for eligibility (n = 37)
Records excluded for not fulfilling inclusion criteria (n = 4)
Studies included (n = 33)

Fig. 1 PRISMA flow diagram showing the selection process of studies included in the scoping review

Table 1 Summary table of the articles included

Questionnaire		Articles	*N*	Total score mean or range	MCID
SNOT-22 (0-110)		10	402	38.6–53.7	8.90*
NOSE (0-100)		14	546	39.0–80.0	28**
NOSE-Perf (0–48)		11	604	13.8–26.4	4.85
SEPEQoL (0–48)		2	126	21.6–24.5	5.04
SNOT-25 (0-125)		2	187	45.2–58.6	11.5
SF-36 (0-100)	Physical summary	1	29	67.2	-
	Mental summary			62.8	-
RSI (0-100)		1	33	41.9	-
GBI		1	98	29.4	-

*Defined for chronic rhinosinusitis. **Defined for nasal obstruction

NOSE

Fourteen studies reported NOSE scores, with baseline values between 39.0 and 80.0, correlating with moderate-to-severe nasal obstruction symptoms [4, 6, 8, 16–26]. Most studies assessing surgery showed significant postoperative reductions.

NOSE-Perf

Eleven studies used the NOSE-Perf QoL instrument, with scores ranging from 13.8 to 26.4, consistent with moderate symptomatology ([3, 9, 17–18, 20, 27–32]). Several large series established minimal important differences (MCID), supporting its validity for NSP.

Table 2 Summary of SNOT-22 results reported by domains

SNOT-22 DeConde et al. Domains	Rhinologic symptoms (0–30)	Extranasal rhinologic symptoms (0–15)	Ear/facial symptoms (0–25)	Sleep dysfunction (0–35)	Psychological dysfunction (0–25)	Global score (0-110)
Alegre et al. 2024	14.6 (6.3)	2.8 (2.0)	6.7 (4.5)	18.6 (11.2)	10.9 (6.0)	46.5 (22.0)
Medikeri et al. 2020	15.0 (5.9)	-	5.3 (6.0)	11.4 (5.2)	14.8 (6.6)	42.9
Khong et al. 2019	15.9 (6.4)	6.6 (6.3)	7.8 (6.2)	12.6 (7.8)	16.3 (8.8)	50.8 (23.8)
Leong et al. 2018	-	6.4 (4.1)	8.1 (6.4)	12.7 (7.5)	17.0 (8.1)	50.2 (23.5)

- : no information available

Other instruments

- ***SEPEQoL***: Demonstrating moderate impairment and significant postoperative improvement [6, 33].
- ***SF-36***: One study documented reduction in both physical and mental summary scores compared with controls [17].
- ***RSI***: One older study reported substantial symptoms burden but was limited by mixed CRS comorbidity [34].
- ***GBI***: One retrospective observational study reported a measurable postoperative quality-of-life improvement following NSP repair using the Glasgow Benefit Inventory [35].

Perforation characteristics

Perforation size was reported variably (diameter, length x height, or area), limiting interstudy comparability. Available data suggested a predominance of anterior perforations and a wide range (up to14.4 mm length and 22 mm height or 400 mm^2 area) [4–9, 11, 13–17, 19–22, 24–26, 30–35]. The aetiology was reported in 24 studies, with prior surgery identified as the most common cause ([3–7, 9, 11–13, 16–17, 19, 21–26, 28–29, 32–35]).

An expanded description of study outcomes and characteristics is available in Supplementary Table S2.

Discussion

This scoping review synthesized all available evidence evaluating QoL outcomes in adults with NSP using validated patient-reported outcome measures. Across 33 studies and a wide array of instruments—including SNOT-22 (10 studies, $n=402$), NOSE (14 studies, $n=546$), NOSE-Perf (11 studies, $n=604$), and SEPEQoL (2 studies, $n=126$)—NSP was consistently associated with clinically meaningful QoL impairment. Collectively, the evidence shows that NSP affects not only rhinologic symptoms such as obstruction, crusting, and epistaxis, but also psychological and functional domains. This multidimensional impact underscores the relevance of comprehensive symptom assessment in patients with NSP.

The magnitude of QoL impairment observed in NSP mirrors that reported in chronic inflammatory sinonasal diseases, such as CRS. Prior reviews in CRS have emphasized the substantial burden of sleep disturbance, emotional distress, and social limitations associated with chronic nasal symptoms. Similar patterns emerged in the present review: patients with NSP frequently reported marked dysfunction across sleep and psychological domains of the SNOT-22, suggesting that the consequences of NSP extend beyond the structural defect. Unlike CRS, where inflammation is the primary driver of symptoms, NSP symptoms are often airflow-dependent, intensifying during exertion or exposure to dry environments. This likely contributes to the comparable, and in some cases greater, burden of disease reported by individuals with NSP.

Although indirect and based on cross-condition comparisons, the magnitude of QoL impairment observed in NSP appears comparable to that reported in CRS cohorts.

Role of perforation characteristics

Despite longstanding clinical interest in the relationship between perforation characteristics and symptom severity, the available evidence remains inconclusive. CFD studies have identified increased airflow velocity, flow exchange across the perforation, and elevated shear stress—particularly along the posterior margin—as potential mechanisms underlying symptoms such as epistaxis and crusting. However, the current clinical literature does not demonstrate consistent associations between QoL scores and perforation size, location, or morphology. Several factors likely contribute to this discrepancy. First, methods for measuring perforation size vary considerably between studies (e.g., diameter, length × height, or calculated area), hindering direct comparison. Second, few studies report the precise location of the defect, despite evidence suggesting that anterior perforations may lead to more significant turbulence and dryness. Third, symptom severity in NSP appears to depend not solely on perforation dimensions but also on mucosal condition, airflow patterns, and individual

patient sensitivity. These findings reinforce the concept that NSP symptom burden is patient-specific rather than purely anatomy-driven. Consequently, standardized reporting of perforation characteristics is essential to clarify these relationships in future research.

Role of aetiology: iatrogenic versus non-iatrogenic NSP

The predominance of iatrogenic NSP, particularly following septoplasty, is a consistent finding across the included studies. Despite this, few studies performed dedicated analyses comparing QoL outcomes according to aetiology. Iatrogenic perforations may differ from non-iatrogenic causes in terms of mucosal integrity, patient expectations, and baseline nasal function, which could influence symptom perception and treatment outcomes.

The lack of stratified reporting limits the ability to determine whether QoL impairment differs meaningfully between iatrogenic and non-iatrogenic NSP. Future studies should aim to standardize aetiological classification and explore its potential impact on both symptom burden and response to treatment.

Surgical repair and postoperative QoL improvement

Studies reporting postoperative outcomes consistently suggested significant improvements across multiple QoL instruments. Reductions in SNOT-22, NOSE, and NOSE-Perf scores after surgical closure reflect meaningful symptom relief, supporting the clinical relevance of repairing symptomatic perforations. In several series, postoperative improvements exceeded established MCID, reinforcing that QoL gains are not only statistically significant but also clinically perceptible. These findings highlight the value of integrating validated QoL measures into both preoperative evaluation and postoperative monitoring, allowing for objective assessment of treatment outcomes and patient satisfaction.

The heterogeneity of surgical techniques and closure success rates across studies further emphasizes the importance of standardized outcome reporting. While most series achieved high closure rates, the variability in follow-up duration and reporting of recurrent perforations limits interpretation of long-term outcomes. The predominance of surgical case series raises the likelihood of publication bias toward positive postoperative outcomes.

Future research should aim to correlate surgical techniques, perforation characteristics, and QoL results to better guide individualized treatment selection.

Strengths and limitations of this review

Strengths of this scoping review include its adherence to PRISMA-ScR guidelines and a comprehensive multi-database search strategy. The inclusion of both disease-specific and NSP-specific QoL instruments provides a broad perspective on symptom burden and functional impairment.

Nonetheless, several limitations should be acknowledged. The included studies exhibited considerable heterogeneity in design, with many relying on small sample sizes or retrospective data collection. QoL outcomes were inconsistently reported across studies, particularly regarding domain-level SNOT-22 results, limiting the ability to perform quantitative synthesis. Variability in the measurement and documentation of perforation size and location further restricted comparative analysis. Additionally, the exclusion of non-English, non-Spanish, and non-French studies may have introduced language bias, and publication bias cannot be excluded given the predominance of surgical series, with most studies originating from tertiary referral centres and reporting positive postoperative outcomes.

Clinical implications

The findings of this review have several important implications for the clinical management of NSP. First, the consistent and significant QoL impairment observed across validated instruments underscores the need to evaluate NSP as more than a structural defect. Patients frequently experience a multidimensional burden—including sleep disturbance, psychological distress, and functional limitations—that may not be fully appreciated during routine clinical examinations. Incorporating validated QoL questionnaires such as SNOT-22, NOSE, or NOSE-Perf into standard clinical assessment enables clinicians to better quantify symptom severity, identify patients most likely to benefit from intervention, and guide shared decision-making.

Second, the strong QoL improvements reported following successful surgical repair highlight the therapeutic value of addressing symptomatic perforations rather than relying solely on conservative measures. While nonsurgical treatments may offer temporary relief, long-term QoL gains appear most pronounced after complete closure. This supports an individualized treatment approach in which QoL metrics, perforation characteristics, patient preferences, and overall health status are jointly considered when selecting between surgery, prosthesis, or observation.

Finally, the lack of clear correlation between perforation size or location and symptom burden suggests that treatment decisions should not rely exclusively on anatomical

parameters. Clinicians should prioritize comprehensive symptom assessment and mucosal evaluation rather than assuming that small or posterior perforations are inherently less disruptive.

Future directions

Several gaps identified in the literature highlight important avenues for future research. Standardization of perforation measurement, classification, and reporting is urgently needed. The current variability in methods used to describe perforations—diameter, length × height, surface area, or qualitative location—limits the ability to compare studies and hinders efforts to understand the relationship between perforation morphology and symptom severity. The adoption of a unified, reproducible reporting system would significantly enhance comparability across clinical and research settings.

There is also a need for prospective, multicentred studies with larger sample sizes and longer follow-up durations. Such studies would allow for more robust assessment of postoperative QoL trajectories, recurrence rates, and technique-specific outcomes. Moreover, the integration of computational fluid dynamics with patient-reported outcomes offers a promising approach to elucidate the mechanisms underlying symptomatic versus asymptomatic perforations, potentially aiding in individualized treatment planning.

Given the unique airflow-dependent symptoms of NSP, further validation and broader adoption of NSP-specific tools—such as the NOSE-Perf and SEPEQoL scales—are warranted. These instruments may better capture the nuances of NSP-related symptoms compared with more general sinonasal questionnaires.

Finally, future research should extend beyond symptom burden to include psychosocial impact, work productivity, economic burden, and patient-centered outcomes such as treatment satisfaction and decisional regret. Addressing these dimensions will provide a more holistic understanding of NSP and strengthen the evidence base guiding clinical management.

This scoping review provides a structured synthesis of a fragmented body of literature, identifies key methodological inconsistencies, and highlights critical gaps to guide future research in NSP.

Conclusion

NSP in adults is associated with significant QoL impairment, particularly in rhinologic and psychological domains. Although a range of validated instruments suggests meaningful symptom burden, heterogeneity in study design and outcome reporting limits current evidence. Routine QoL assessment should be integrated into NSP management, and future studies should focus on standardized reporting and robust prospective outcomes.

Overall, the certainty of evidence—particularly regarding surgical outcomes—remains low to moderate due to heterogeneity and study design limitations.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s00405-026-10275-z.

Declarations

Informed consent For this type of study, formal consent is not required.

Research involving human participants and/or animals This article is a scoping review of previously published studies and does not contain any new studies with human participants or animals performed by any of the authors.

Conflict of interest The authors declare that they have no conflict of interest.

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